Assignment 5 Solution

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CS432

Problem:

1. We know the result of the Karate Club (Zachary, 1977) split. Prove or disprove that the result of split could have been predicted by the weighted graph of social interactions. How well does the mathematical model represent reality?

Generously document your answer with all supporting equations, code, ggraphs, arguments, etc.

Solution:

As the algorithm depends on highest centrality as a weight of degrees, a node with higher degrees of edges or friendships is more likely to split. A Karate Club graph is created using `nx.karate_club_graph()`. Girvan Newman is continuous until there are no longer any removable edges. Betweenness is calculated using nx.edge_betweenness_centrality(G). The node list is sorted by its highest centrality using:

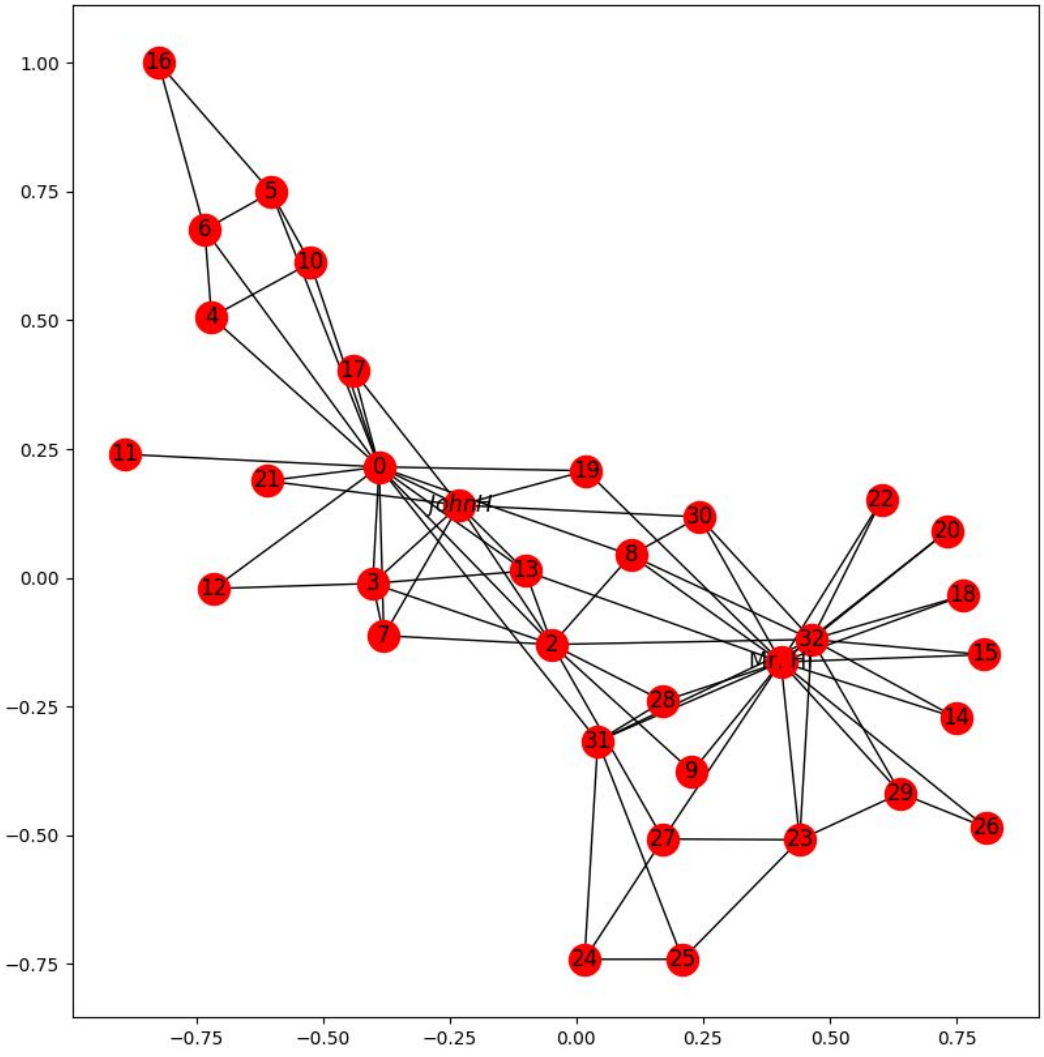
```
list = sorted(b,key=lambda x:x[1],reverse=True).
```

This allows us to remove the element with the highest centrality `G.remove_edge(*list[0][0])`. These techniques were found in the following article: https://gawron.sdsu.edu/python_for_ss/course_core/book_draft/Social_Networks/Networkx.html .

The function `def display(num)` is responsible managing subgraphs. It contains a condition for changing component color when a graph is split. Predefined label formatting is done in `def initialLabel()`.

Comparing examples 1 and 12 below show that some of the initial structure shape was preserved after the splitting, so they do still look similar.

Ex: 1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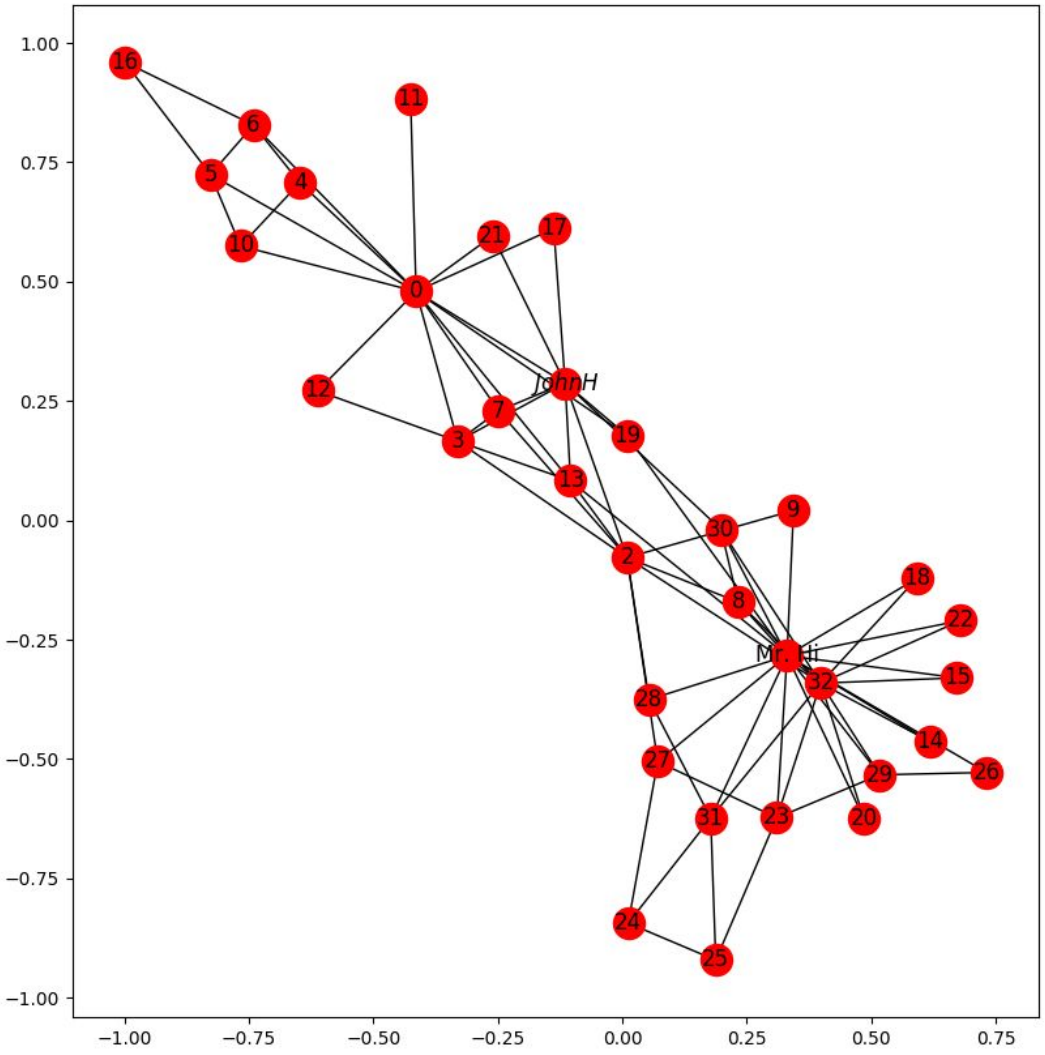
Ex: 4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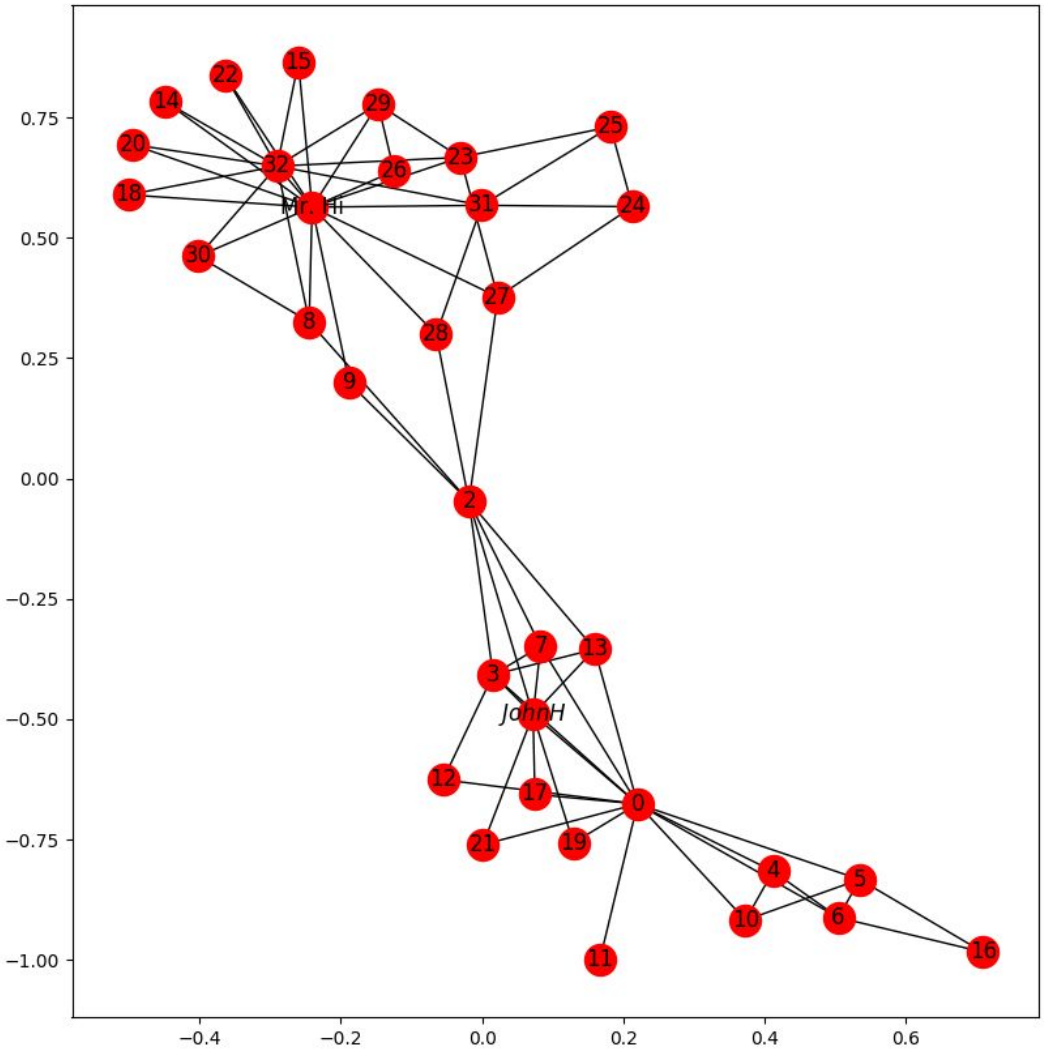
Ex: 8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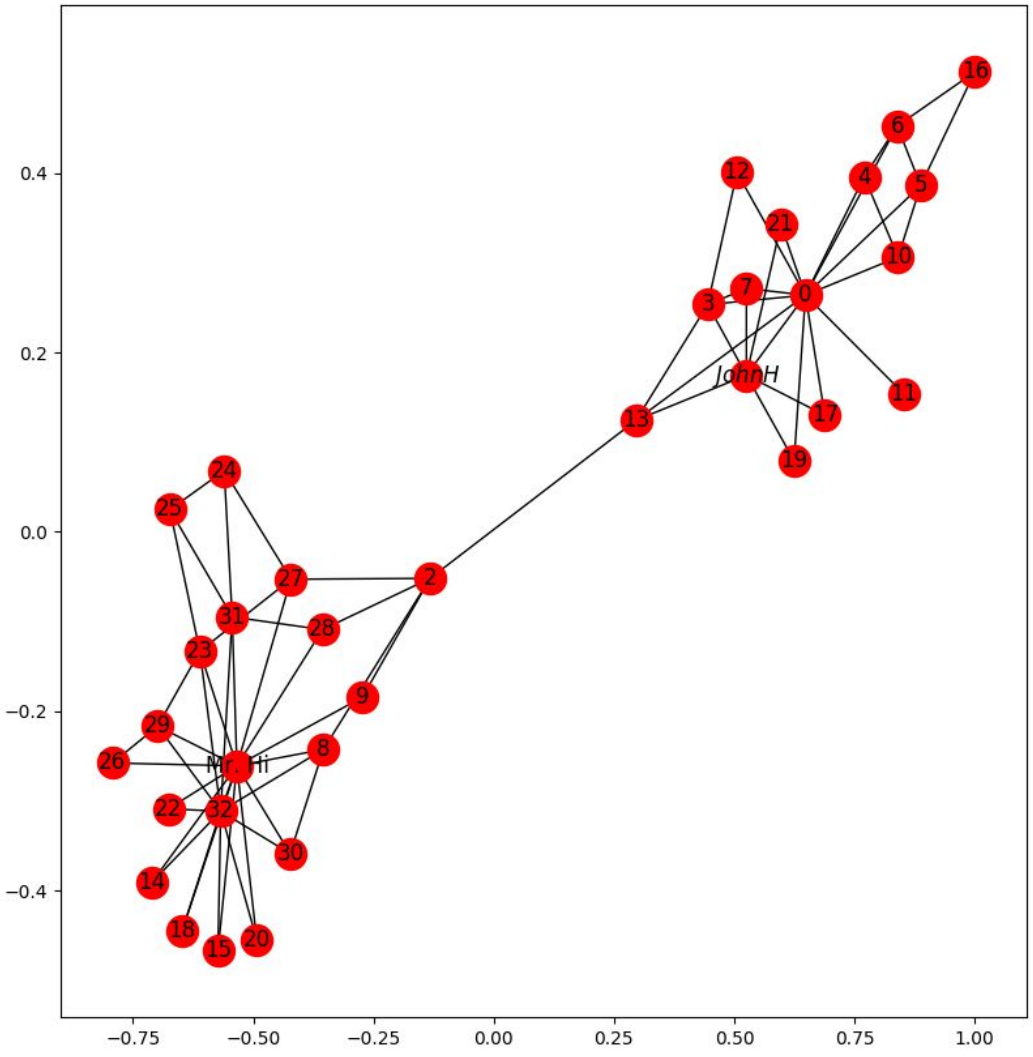
Ex: 11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Mr. Hi
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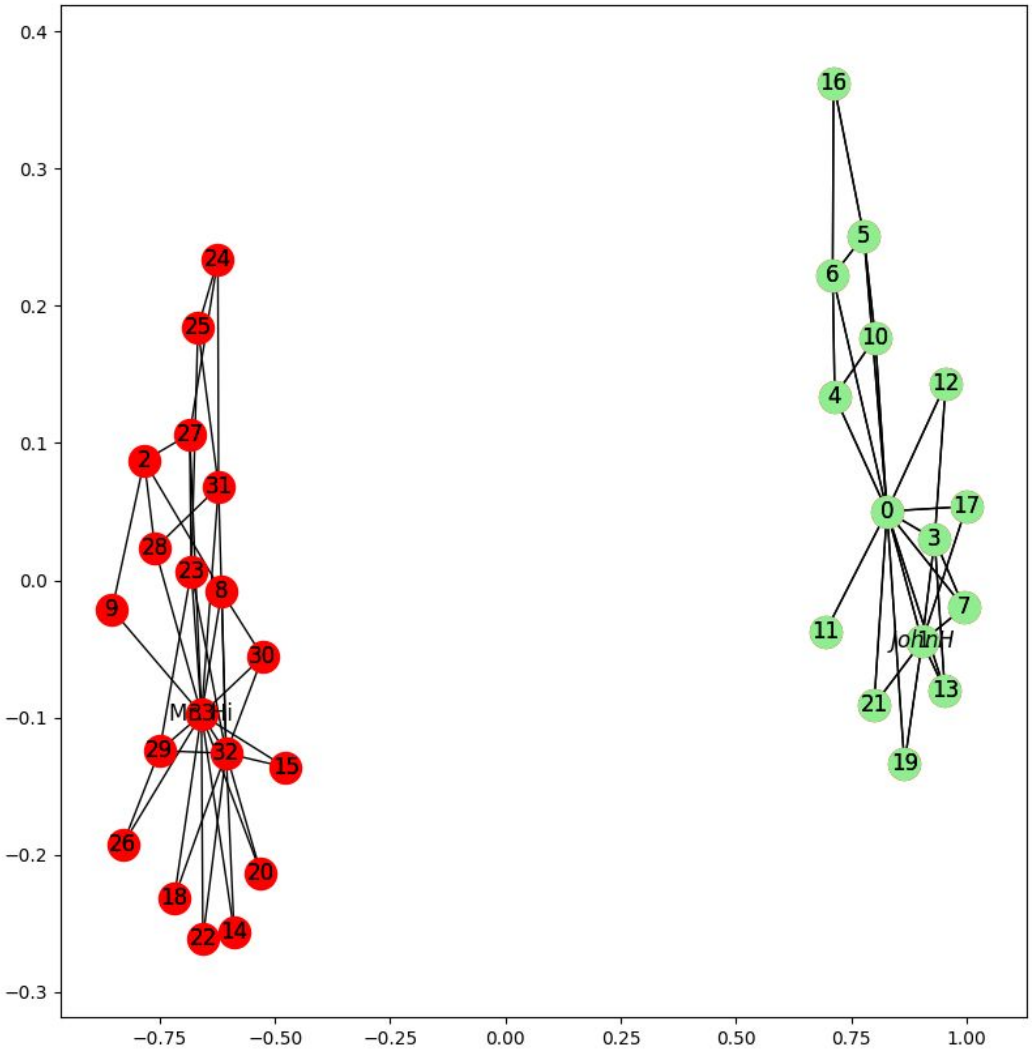
Ex: 12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